

HYBRID CERAMIC MATRIX COMPOSITE TURBINE BLADES FOR IMPROVED PROCESSIBILITY AND PERFORMANCE

ABSTRACT

The present invention is a ceramic matrix composite turbine engine component, wherein the component has a direction of maximum tensile stress during normal engine operation. The component comprises a plurality of biased ceramic plies, wherein each biased ply comprises ceramic fiber tows, the tows being woven in a first warp direction and a second weft direction, the second weft direction lying at a preselected angular orientation with respect to the first warp direction, wherein a greater number of tows are woven in the first warp direction than in the second weft direction, and wherein a number of tows in the second weft direction allows the biased plies to maintain their structural integrity when handled. The plurality of biased plies are laid up in a preselected arrangement to form the component, and a preselected number of the plurality of biased plies are oriented such that the orientation of the first warp direction of the preselected number of biased plies lie about in the direction of maximum tensile stress during normal engine operation. A coating is applied to the plurality of biased plies. The coating is selected from the group consisting of BN, SiC, and combinations thereof. A ceramic matrix material lies in interstitial regions between the tows of each biased ply and the interstitial region between the biased plies.